including a network cloud; and

a mirroring controller, responsive to the information being written from the CPU to the first storage system, to mirror at least some of the information written from the CPU to [stored in] the first storage system in the second storage system by transferring the at least some of the information over the network cloud.

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REMARKS

In response to the office action mailed June 25, 1998, Applicants respectfully request reconsideration. To further the prosecution of this application, amendments have been made in the claims, and the claims as presented are believed to be in allowable condition.

Claims 1-61 are pending in this application, of which claims 1, 22, 31, 37, 39, 47, 53, 56, 59, and 61 are independent. Claims 1, 11, 13, 22, 31, 37, 39, 47, 53, 56, 59, and 61 have been amended.

Objection to Specification

The Examiner objects to the title as not being descriptive. Applicants have amended the title in response to the Examiner's objection.

Claim Objections

Claim 59 is objected to on the grounds that it states "one of a packet switched network and a cell switched network." The Examiner questions whether this line should instead state "one of a packet switched network or a cell switched network" (emphasis added). Claim 59 recites an alternative expression in the accepted Markush claim format. According to MPEP 2173.05(h):

> Alternative expressions are permitted if they present no uncertainty or ambiguity with respect to the question of scope or clarity of the claims. One acceptable form of alternative expression, which is commonly referred to as a Markush group, recites members as being "selected from the group consisting of A, B and C." See *Ex Parte Markush*, 1925 C.D. 126 (Comm'r Pat. 1925).

Applicants have amended claim 59 to include the "selected from the group consisting of" language to clarify that claim 59 employs the accepted Markush claim format. Thus, Applicants

request that the objection to claim 59 be withdrawn.

Claim Rejections - 35 USC §112

Claims 56-58 are rejected under 35 U.S.C. 112, first paragraph, as allegedly containing subject matter which is not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. More specifically, the Office Action states (paragraph 5) that "[t]here is no support in the specification nor drawings to support a communication link being selected from one of an Ethernet link, an asynchronous transfer mode (ATM) link, an FDDI link, and a fibre channel link." Applicants respectfully disagree.

The application states on page 6, lines 12-14 that "the at least one communication link [is] selected from one of an Ethernet link, an asynchronous transfer mode (ATM) link, an FDDI link and a fibre channel link." Similarly, the application states on page 10, lines 17-19 that "a number of different direct physical connections to the network cloud 15 are possible, including, but not limited to, Ethernet, Fast Ethernet, Gigabit Ethernet, fibre channel, asynchronous transfer mode (ATM) and FDDI connections." These passages provide clear and direct support for the claim language to which the Office Action objects. Applicants therefore respectfully request that the rejection of claims 56-58 under §112, ¶1 be withdrawn.

Claim 45 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for allegedly failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. More specifically, the Office Action states that there is insufficient antecedent basis for "the third storage system" in line 4 of claim 45. Applicants respectfully disagree.

Antecedent basis for "the third storage system" is provided in lines 1-2 of claim 45, which state "The method of claim 39, wherein the computer system further includes a third storage system coupled to the CPU through the network cloud . . ." (emphasis added). Because claim 45 provides antecedent basis for "the third storage system," Applicants respectfully request that the rejection of claim 45 under §112, ¶2 be withdrawn.

Claim Rejections - 35 USC §102

Claims 1-3, 10-11, 18-19, 39, 40-41, 46-49, 51-52 and 61 are rejected under 35 U.S.C. 102(b) as being anticipated by Ohran (USPN: 5,835,953).

Ohran describes a backup system for maintaining logically consistent backups using minimal data transfer. The backup system described by Ohran includes a backup storage device and one or more primary systems having mass storage devices that are to be backed up on the backup storage device. The primary systems identify changes that are going to be made to the mass storage device. The combined effected locations in the mass storage device of these identified changes are then captured in a static snapshot when the mass storage device is in a logically consistent state. Only those data blocks changed since the last backup are transferred to the backup system. The backup system can then store these changes or apply the changes to the backup storage device to bring the backup storage device current to a particular point in time.

Each of the independent claims rejected as being anticipated by Ohran (i.e., claims 1, 39, 47 and 61) is directed to a computer system, or a method of operating a computer system, that mirrors information stored in a first storage system in a second storage system. Ohran is not directed to a system that performs a mirroring of data. Rather, as described above, Ohran is directed to a backup system that transfers data that has previously been stored in a mass storage device to a backup system. The backup process of Ohran assumes that the data to be transferred from the primary mass storage device is already stored in the primary mass storage device before the backup process begins (col. 5, lines 39-42). The backup process identifies changes that need to be made to bring the backup storage device into sync with the primary mass storage device (col. 5, lines 46-53). Once the backup process identifies the changes that need to be made to the backup storage device, the backup process sends the changes to the backup system (col. 5, lines 58-60). According to Ohran, either the primary system or the backup system can initiate a backup (col. 14, lines 48-49). The backup process described by Ohran is therefore not responsive to data being written to the primary mass storage device. Rather, Ohran explicitly states that the backup process assumes at the outset that the data to be transferred is already stored in the

primary mass storage device before the backup process begins. Furthermore, Ohran states that "a static snapshot of the primary mass storage device is taken" to "preserve the original data of the primary mass storage device during the backup process" (col. 5, lines 62-65). It is therefore clear that the backup process of Ohran is not initiated by data being written to the primary mass storage device.

Each of independent claims 1, 39, 47 and 61 has been amended to clarify the distinction between a mirroring process and the backup process of Ohran. In this respect, claims 1 and 61 each has been amended to recite the mirroring controller as being "responsive to the information being written from the CPU to the first storage system" to mirror at least some of the information written to the first storage system in the second storage system. Similarly, claim 39 has been amended to recite the step of transmitting at least some of the information written to the first storage system into the network cloud to be "in response to the information being written from the CPU to the first storage system". Finally, claim 61 has been amended to recite the mirroring controller as being "responsive to the information being written from the CPU to the first storage system" to mirror at least some of the information written to the first storage system in the second storage system. Support for these amendments is found, for example, at page 1, lines 22-25 of the specification, which describes mirroring as "[o]ne solution for protecting the data stored in [a] storage device 3 . . . . As data is written to the source storage device 3, it can also be written and mirrored to the target storage device 9."

As should be appreciated from the foregoing, Ohran does not suggest a controller that transfers or mirrors information in response to the CPU writing such information to a storage system, nor a method of mirroring information in response to information being written from the CPU to the storage system. Therefore, each of claims 1, 39, 47 and 61 is believed to patentably distinguish over Ohran, such that the rejection of these claims under 35 U.S.C. §102 as being anticipated by Ohran should be withdrawn.

Claim 2-3, 10-11 and 18-19 depend from claim 1 and are patentable for at least the same reasons. Similarly, claims 40-41 and 46 depend from claim 39, and claims 48-49 and 51-52 depend from claim 47 and are patentable for at least the same reasons.

In view of the foregoing, the rejection of claims 1-3, 10-11, 18-19, 39, 40-41, 46-49, 51-52 and 61 under 35 U.S.C. §102 as being anticipated by Ohran should be withdrawn.

Claim Rejections - 35 U.S.C. §103

Claims 5, 9, 13, 14, 22-37, 45 and 53-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohran (USPN: 5,835,953) in view of Sparks (USPN: 5,212,784).

Claims 5, 9 and 13-14 depend from claim 1 and claim 45 depends from claim 39, such that each of these claims patentably distinguishes over Ohran for at least the same reasons. Nothing in Sparks overcomes the deficiencies of Ohran with respect to disclosing the limitations recited in claims 1 and 39, such that the rejection of these dependent claims under §103 as being obvious over Ohran in view of Sparks should be withdrawn.

With respect to independent claim 22, the Office Action states that Ohran teaches a computer system comprising a central processing unit, a first storage system that is coupled to the CPU so that the CPU can store information in the first storage system, a second storage system, at least one communication link coupling the second storage system to the CPU, and a mirroring controller to mirror at least some of the information stored in the first storage system in the second storage system by transferring the at least some of the information through the network cloud to the second storage system. The Office Action concedes that Ohran does not explicitly teach a communication link including a wireless connection, but states that Ohran discloses that any communication link could be used with the system, and further that Sparks suggests using a wireless connection in a backup system.

Claim 22 has been amended to recite the mirroring controller as being "responsive to the information being written from the CPU to the first storage system." As discussed above, the backup process described by Ohran is not responsive to data being written to the primary mass storage device. Thus, Ohran does not disclose or suggest "a mirroring controller, responsive to the information being written from the CPU to the first storage system, to mirror at least some of the information written from the CPU to the first storage system in the second storage system" as recited in claim 22.

The suggested combination of Ohran with the wireless connection described by Sparks would not include the mirroring controller recited in claim 22. Therefore, claim 22 patentably distinguishes over the suggested combination, and the rejection of claim 22 under 35 U.S.C. §103 should be withdrawn. Claims 23-30 depend from claim 22 and patentably distinguish over the combination of Ohran and Sparks for at least the same reasons.

With respect to independent claim 31, the Office Action states that Ohran teaches a central processing unit, a first storage system, a first communication link coupling the first storage system to the CPU so that the CPU can store information in the first storage system, a second storage system, a second communication link coupling the second storage system to the CPU, and a mirroring controller to mirror at least some of the information stored in the first storage system in the second storage system. According to the Office Action, although Ohran does not teach a third storage system having a third communication link wherein information from the primary storage unit is mirrored thereto, Sparks suggests using a third storage system and a third communication link for coupling the storage device to the CPU as an additional backup system, wherein some of the information stored in the CPU would be mirrored or copied thereto.

Ohran does not, however, disclose or suggest "a mirroring controller responsive to the information being written from the CPU to the first storage system to mirror at least some of the information written from the CPU to the first storage system in both the second and third storage systems," as recited by claim 31, as amended. As discussed above, the backup process described by Ohran is not responsive to data being written to the primary mass storage device. Ohran, therefore, fails to disclose or suggest an express element of claim 31.

Although the Office Action states that Sparks suggests using a third storage system and a third communication link wherein some of the information stored in the CPU would be mirrored or copied thereto, Sparks describes backing up data, not mirroring data. Sparks is directed to "[a]n automated concurrent data backup system and method" (Abstract; emphasis added). Sparks states that "[w]hen a backup is desired, the primary controller is programmed to detect a specified 'trigger' signal from the CPU," and "[t]he backup device controller . . . starts the

backup operation with respect to the data stored on the primary storage device designated for being backed up" (col. 2, lines 17-25; emphasis added). The backup device controller "transfers the data that it reads from the designated primary data storage device to the backup storage device" (col. 2, lines 34-36). As described above, such a backup operation is different from the mirroring performed by the mirroring controller of claim 31. In particular, the backup operation described by Sparks is initiated in response to a specified "trigger" signal from the CPU, not in response to information being written from the CPU to the first storage system, as recited by claim 31.

Because neither Ohran nor Sparks discloses or suggests the mirroring controller of claim 31, the suggested combination of Ohran with Sparks would not include the mirroring controller recited by claim 31. Therefore, claim 31, as well as claims 32-36 that depend therefrom, patentably distinguishes over the suggested combination, such that the rejection of these claims under §103 as being obvious over the combination of Ohran and Sparks should be withdrawn.

Independent claim 37 was rejected over the combination of Ohran and Sparks for similar reasons. Claim 37 has been amended to recite the mirroring step as being done "in response to the information being written from the CPU to the first storage system." As discussed above, the combination of Ohran and Sparks does not teach such a mirroring step. Therefore, claim 37 patentably distinguishes over this combination of references, and the rejection of claim 37 under 35 U.S.C. §103 as being obvious over Ohran in view of Sparks should be withdrawn.

Claims 6-8, 12, 15-16, 20-21, 42-44, 50 and 56-58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohran (USPN: 5,835,953) in view of Staheli (USPN: 5,537,533).

Each of claims 6-8, 15-16, 20-21, 42-44 and 50 depends from an independent claim which patentably distinguishes over Ohran for reasons discussed above. Staheli has been relied upon solely to teach the use of various types of communication links, and does not correct the deficiencies in Ohran with respect to teaching mirroring communication. Therefore, each of these dependent claims patentably distinguishes over the combination of Ohran and Staheli for at least the same reasons as the independent claim from which it depends.

With respect to independent claim 56, the Office Action states that Ohran teaches a

computer system comprising a central processing unit, a first storage system that is coupled to the CPU so that the CPU can store information in the first storage system, a second storage system, at least one communication link coupling the second storage system to the CPU, and a mirroring controller to mirror at least some of the information stored in the first storage system in the second storage system by transferring the at least some of the information over the communication link. The Office Action further states that although Ohran does not explicitly teach a communication link being selected from one of an Ethernet link, an asynchronous transfer mode (ATM) link, an FDDI link, and a fibre channel link, Staheli does disclose such a communication link for coupling the second storage system to the CPU.

As discussed above, Ohran does not disclose or suggest "a mirroring controller, responsive to the information being written from the CPU to the first storage system, to mirror at least some of the information written from the CPU to the first storage system in the second storage system," as recited by claim 56, as amended. Rather, the backup process described in Ohran is not responsive to data being written to the primary mass storage device. Ohran, therefore, fails to disclose or suggest an element of claim 56.

Because Ohran does not disclose or suggest the mirroring controller of claim 56, the suggested combination of Ohran with the communication link described by Staheli would not include the mirroring controller recited in claim 56. Therefore, claim 56, as well as claims 57-58 that depend therefrom, patentably distinguishes over the combination of Ohran and Staheli, such that the rejection of these claims under 35 U.S.C. §103 as being obvious over this combination of references should be withdrawn.

Claims 4, 17, and 59-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohran (USPN: 5,835,953) in view of Black (Computer Networks: Protocols, Standards, and Interfaces, 2nd Edition, 1993).

Claims 4 and 17 are dependent claims that depend from claim 1, and that patentably distinguish over the prior art of record for at least the same reasons. Therefore, the rejection of these claims under 35 U.S.C. §103 should be withdrawn.

With respect to independent claim 59, the Office Action states that Ohran teaches a

computer system comprising a central processing unit, a first storage system that is coupled to the CPU so that the CPU can store information in the first storage system, at least one communication link coupling the second storage system to the CPU, and a mirroring controller to mirror at least some of the information stored in the first storage system in the second storage system by transferring the at least some of the information over the communication link. The Office Action further states that although Ohran does not explicitly teach a communication link being one of a packet switch network and a cell switch network, Ohran does state that any communication link could be used with the system and that the choice of communication link is an issue of design choice. Furthermore, the Office Action states that Black teaches that organizations with low to medium traffic volumes could benefit from a packet switch network because most of the carriers charge on the volume of traffic.

Claim 59 has been amended to recite the mirroring controller as being "responsive to the information being written from the CPU to the first storage system to mirror at least some of the information written from the CPU to the first storage system in the second storage system." As discussed above, the backup process of Ohran does not teach such a mirroring controller. Black similarly does not teach such a mirroring controller, such that claim 59, as well as claim 60 which depends therefrom, patentably distinguishes over the combination of Ohran and Black, so that the rejection of claims 59-60 under 35 U.S.C. §103 over this combination of references should be withdrawn.

CONCLUSION

In view of the foregoing amendments and remarks, this application should now be in condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes that, after this amendment, the application is not in condition for allowance, the Examiner is requested to call the Applicants' attorney at the number listed below to discuss any outstanding issues relating to the allowability of the application.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicants hereby request any necessary extension of time. If there is a fee

occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Respectfully submitted,
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